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By-Mayher, John Sawyer

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Transformational grammar offers the most adequate system by which to meet the goal of grammar instruction, which is to increase the student's understanding of the nature of language. This grammar attempts to explain the mental processes underlying the production and understanding of sentences, to describe linguistic competence, to construct linguistic descriptions of particular languages and a theory of the nature of language, to distinguish between grammatical and ungrammatical sequences, and to judge how well it is fulfilling its tasks. The teaching of transformational grammar, which can begin formally with seventh-graders, offers many possiblities for student involvement in genuine linguistic problems--examination of the constituents of sentences, the relationship between deep and surface structure, the relationships between sentences, and the principles of transformations. (JS)

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The Growing Edges of Secondary English

Essays by the Experienced Teacher Fellows at the University of Illinois 1966-1967

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Editors:
Charles Suhor
John Sawyer Mayher
Frank J. D'Angelo

NATIONAL COUNCIL OF TEACHERS OF ENGLISH
508 South Sixth Street **Champaign, Illinois 61820**

TRANSFORMATIONAL GRAMMAR IN ACTION

by JOHN SAWYER MAYHER

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Mr. Mayher, who received his B.A. from Williams College and his M.A.T. from Harvard's Graduate School of Education, has taught at Homestead and Cubberley High Schools on the San Francisco peninsula, has participated in an NDEA Institute in Criticism at the University of the Pacific, and is currently working on a doctorate in English education at Harvard. In this essay he explains some of the central aspects of transformational generative grammar and advocates their inclusion in the secondary school English curriculum.

The relationship between linguistic science and theories of instruction in English for native speakers has never been a very precise one, and secondary school English teachers have been unclear about what they could or should do about grammar instruction. After being bombarded with claims and counterclaims about this or that variety of linguistics, even those English teachers who have tried to develop an honest and constructive program have frequently despaired in the attempt. Neither giving up nor pretending that we already have all the answers is a defensible attitude, however, since the developments in linguistics during this century and particularly during the last decade do have considerable relevance to our purposes in the secondary classroom.

It should be clear at the outset that transformational grammar is neither a panacea for our troubles nor something that is easily understood. While it does represent an interesting and vital revolution in the science of linguistics, it has not been designed to service English pedagogy. Many or even most of the actual effects of this approach to grammar will develop as a result of the teacher's familiarity with the theory rather than through direct initiation of secondary school students into its mysteries. If a teacher knows transformational linguistics, his approach to language will never be the same again, and the insights he has gained into the nature of language will pervade all of his teaching.

One of the principal teaching benefits of the transformational approach to English is its attempt to explain what a speaker must know in order to speak his language. While our pedogogical version of the grammar will never be as rigorous as a scientific grammar, if it incorporates the insights of scientific grammar it should be extremely valuable. For example, virtually every secondary school student should be able to recognize which of the following sequences are English sentences long before he has had any formal language training:

(1) George loves to eat watermelons.
(2) Watermelons to loves George eat.

(3) Watermelons love to eat George.
(4) Watermelons are eaten by George.
(5) Watermelons are loved to eat by George.

Given these sentences he would probably say that (1) and (4) are ok, that (2) is completely wrong, and that there is something funny about (3) and (5). By saying these things he is already a grammarian, and the search for more precise ways to explain what he knows to be true about these sequences is what grammar is all about. Since he uses language all the time, such introductory exercises should motivate him to study it further. Upon this basis we will build our pedagogical strategy, and it is on this basis that the theory itself has been built.

Any objectives for teaching English to native speakers must be formulated in terms of the most accurate and penetrating knowledge of the nature and uses of language. To teach language a teacher must know clearly what the student already knows about his language before he ever begins to receive any formal instruction. Unfortunately a discussion of a complete program in language is beyond the scope of this paper, however, and I will not touch on such important areas of language learning as the study of the history of language, dialects, and so on.

Following the first section on goals, in "Where Do 'Grammars' Come From?" I will try to define the concepts of language, linguistic description, grammar, and so on as viewed by the transformational theorists. These concepts are both fundamental to understanding how to use the theory and very different from the ideas usually held by English teachers with little or no linguistic training. These ideas, which have been developed by a group of linguists led by Noam Chomsky, are not to be taken as fixed or static, but like the results of any science they call for and are receiving constant scrutiny and revision. The last section deals with some possible methods of teaching transformational grammar to high school students to meet the goals described below.

SOME GOALS FOR GRAMMAR INSTRUCTION

Secondary school English teachers have been traditionally little concerned with teaching grammar for goals or values inherent in the study itself. Even those teachers who recognized such inherent importance have been unclear as to what extent it should be stressed. Many teachers are too uninformed about the scientific study of language to examine adequately all of the possible adaptations of linguistics to teaching. While teachers will be increasingly better prepared as new curricula are developed and new university courses offered in all aspects of language, the problem of what grammar or grammars to teach will probably be

with us for some time to come. Grammar is particularly troublesome for two reasons: first, because there is and has been legitimate dispute within the field of linguistics about the relative value of various grammars, and, second, because as English teachers we have never been fully clear about why we teach grammar at all.

For most of the recent past, the teaching of grammar has been thought of as essentially functional or practical. Teachers of English have not tried to justify the teaching of grammar as an illuminating study in itself largely because it has never been very illuminating to them. While this was somewhat changed with the advent of structural linguistics, most grammar teaching continued to be defended on the grounds that it would improve the writing, speaking, or reading abilities of students. Some of the practical justifications which have been advanced have been that learning grammar will prevent errors in the composing process, that it will provide a common vocabulary for teachers and students to use in discussing writing problems, or that it will help students to understand the syntactic patterns of modern poetry.

All of these arguments have considerable force, and the teaching of grammar may prove to be of value in all of these areas. Additional research may show more correlations between a knowledge of grammar and improvement in other aspects of English. My contention is that such correlations do not now provide adequate justification for the teaching of grammar and that there are more valid justifications which we should consider.

Two considerations are paramount in formulating objectives and a rationale for grammar instruction. The first involves deciding what a grammar is and which grammar or grammars are the most adequate in terms of the standards by which linguists measure or evaluate a grammar's descriptive adequacy. The second concerns the goals of grammar instruction which we want all students to reach. The first will be considered more specifically in the next section, and it is only necessary to comment here that for most teachers of English this has never been a real issue. This has been true because we have assumed that the grammars we found in school books were the only way of dealing with grammatical problems. If we recognized their inadequacy, we have usually decided that grammar in and of itself wasn't really very relevant to what we were doing anyway. While the adequacy or inadequacy of the grammar we teach will be important to us when we begin to decide questions of what, when, and how to teach it, if we can't develop a rationale for teaching even the most adequate possible grammar then we won't have to teach any grammar at all.

The second issue is both more central and more difficult. We must, of course, consider the possibility of correlations between grammar study and improved writing, speaking, and reading, so that we don't omit from our program those aspects which we know or suspect to have correlative value. Our fundamental rationale for the teaching of grammar, however, must spring from our belief that students should understand the nature and structure of language in general and of English in particular. Our concern should also be to teach grammar in such a way that at each step it promotes further learning about language and develops increased ability to use language. If we assume for a moment that we do possess a grammar which is formulated in terms of an adequate theory of language and consists of an adequate description of English, what reasons do we have for teaching it in the secondary English classroom?

Our justification and methods for teaching such a grammar must be based on a rationale consisting of our understanding of the learning process and our desire to promote the understanding of the nature of language. The aim of "understanding" is, of course, too vague and too unmeasurable to be of much value in actually specifying either a curriculum in grammar or methods of implementing it. Nevertheless, such an aim, however vague, must be at the base of our grammar teaching. If it is, we can avoid seeking to achieve the essentially hopeless and irrelevant objectives of keeping the language pure or prescribing a strict set of postulates for language use. These "objectives" and others like them have hampered teachers and students for too long, and we must reformulate objectives to be consistent with the scientific study of language.

The nature of language is more directly relevant and more accessible to us than the domain of any of the other sciences, since, as Michael Geis of the University of Illinois has said, it is "the one scientific study in which the laboratory is in your head." The vital role that language plays in human life is evident to anyone, but the need for understanding its nature, while less evident, is nonetheless strong. All of us are constantly using and consciously or unconsciously reacting to a communicative medium whose effects upon us are potentially great but whose nature we little understand. By teaching children to understand more clearly the nature of language, we should increase their control over it and develop their power as investigators as well.

Part of this control involves the "creative" use of language. There are two separate kinds of creative language use: creativity within the rules which govern the language, and creativity which involves changing, modifying, or deviating from those rules. All of us are involved in the first kind of creativity whenever we speak or understand a sentence

which is new to us and is not one of the habitual stock responses such as a greeting. The degree to which such creativity can be developed by instruction in linguistics is problematical, but the more we know about the possibilities and options available in using and responding to language, the more creatively we will be able to choose among them. Further, a thorough understanding of the nature of language and the rules which govern its use should make it possible for us to deliberately and intelligently violate the rules. Many of our students might well increase the communicative effectiveness of their language use by learning precisely how and why to violate the rules. Such violations, not to be confused with simple "errors," are, after all, a very real stylistic tool of the most accomplished users of language.

The specific objectives which we formulate to implement the teaching of grammar must be consistent with the aim of increasing student understanding of the nature of language. Any specific objectives or a teaching lesson based on such objectives must be evaluated in terms of the broader aim. Therefore, while it is easy enough to tell whether or not a student has mastered a specific concept, we must remember that the utility of the concept is only validated by whether or not it leads to the overall aims of the program. Similarly, it is obvious enough that students must be introduced to concepts at a level slightly above their level of achievement. Nevertheless, the value of any sequence cannot be judged by how well or how easily students can attain its various steps but rather by evaluating how closely the final result approximates the overall instructional aims.

WHERE DO "GRAMMARS" COME FROM?

Language is an interesting study because of its vital role in human communication and human life, but it is important in any linguistic study to distinguish sharply between language and speech. In broad terms linguistics is interested in both language and speech, but recent studies have emphasized the need for this distinction in order to explain the difference between what a person knows about his language and the way he uses it in everyday situations. A language can be described as a system of abstract objects. Linguists often employ the analogy of a symphony to explain that speech can be thought of as the actual verbal behavior which is related to language in the same way that the performance of a symphony is related to the abstract object which is the symphony itself. Just as symphony performances can and do vary, so does the way in which any native speaker uses his language. These variations, which in language are affected by such things as memory, audience, and

other poorly understood environmental and biological-psychological factors, do not necessarily reveal variations in the speaker's underlying knowledge of his language.

This distinction between language knowledge and speech performance is basically the difference between *linguistic competence* and *linguistic performance*. The work of Chomsky and his colleagues has been almost wholly devoted to developing a theory of language which is based on linguistic competence. The data which they use and the intuitions upon which much of their work is based are, of course, based on performance. What they are trying to explain, however, is the mental reality underlying the actual production and understanding of sentences. They assert that it is the existence of such an underlying structure of language which enables speakers to produce and understand sentences which are completely new to them. The domain of scientific linguistics is the characterization of this underlying structure by means of an abstract formal system which in some way can parallel what a native speaker does.

One of the most important differences between transformational theory and those that preceded it has been a concern for precisely defining such notions as *grammar* and *possible grammar of a language*. Many earlier linguists had made significant and important discoveries about languages, but, because they had not formulated any clear idea of what a grammar ought to be (nor even seen any need to do so), their insights went largely unexploited or undeveloped. For example, since they did not try to explain systematically all of the grammatical relations which obtain in a sentence or to show the relations between sentences, they never discovered much of the systematic nature of language, its various levels of structure, or the many underlying similarities between languages. They could see that structure, meaning, and sound were related, but by failing to describe such relationships systematically they were limited to achieving insights about particular sentences and constructions without any possibility of fusing them into a meaningful whole. This last is an extremely complex endeavor and has by no means been accomplished by transformational theory to date. But, by attempting to achieve it, the transformationalists have developed a theory and a methodology which can tell us more about language than we have ever known.

Pedagogical linguistics (a fancy phrase for grammar teaching) attempts to employ the students' unconscious knowledge of their internal grammar to improve their understanding and performance. Each of our students, no matter how "slow," speaks *his* language on the basis

of a complete grammar of *his* dialect unless he has a pathological speech problem. That grammar may not be identical to that of the standard American English needed to function maximally in our society, or, if it is, it may not be very well realized in performance. We cannot start teaching him successfully on any other basis than by building on what he already knows. The pedagogical grammar suggested here is an attempt to do just that.

To describe linguistic competence, transformational linguists have pursued two interrelated goals. The first has been to construct *linguistic descriptions* of particular languages actually spoken by human communities. (Such languages are called *natural languages*, and their descriptions are called *grammars*.) Grammars of particular languages are being constructed in terms of the second major goal of linguistics: a theory of the nature of language. The theory of language seeks to describe a structure common to all natural languages and to provide through its rules a model for the grammars of particular languages as well as a definition of the notion of grammar itself. Since we are concerned here only with English, the overall theory need not concern us much, but it is important to remember that many of the most significant insights of transformational theory have resulted from the pursuit of this second goal.

I will use the term *grammar* to refer almost exclusively to the structural aspects of language. Although in a complete linguistic description attention must be paid to the role of meaning (semantics) and of sound (phonology), most current work in both areas seems to show that both function to interpret structures described by the syntax. Therefore, both English teachers and students should understand syntactic theory first.

Scientific Grammar

A scientific grammar of American English, in its most general form, attempts to characterize the internal grammar by which an ideal (and therefore hypothetical) native speaker relates sound and meaning. But as all of the linguists and psycholinguists who have been influenced by this theory have repeatedly emphasized, the grammar described by the theory is an abstract device. It attempts to explain what a native speaker-hearer does, but the grammar itself is not a model of the speaker's internal grammar or of the way he actually produces and understands sentences. Much of the recent work in psycholinguistics has attempted to define the relationship between the logical formal system of the theory and the internal grammar of the speaker. The two

may prove to be similar eventually, but it must be strongly emphasized that the grammar we are discussing here is not that of the speaker but rather a system which attempts to explain what he knows.

Chomsky's term for his theory (and the theories of others who are trying to achieve the same ends) is *generative grammar*, which he defines as simply a system of rules that in some explicit and well-defined way assigns structural descriptions to sentences.[1] The term *generate* means "assign structural description to," and therefore to say a grammar generates a sentence means only that it assigns a structural description to it and *not* that it describes how a speaker might produce it. The definition of *sentence* as used by Chomsky and others is also different from the traditional one of the school grammars ("A sentence is a group of words which expresses a complete thought"), which was based on meaning and yet, ironically, was meaningless unless one already knew what a sentence was. In a generative grammar, on the other hand, it takes the entire grammar of a language to fully define the notion of sentence in that language, because only a complete grammar can show the rules for generating all the possible sentences of the language.

Related to the problem of defining what a sentence is is another idea about sentences in a natural language. This is that there is an infinite number of sentences possible in any natural language; or, to say it another way, there is no longest sentence in such a language. For example, the rules of English permit us to say "I know one word" or "I know two words" and so on to infinity. Similarly, we can add adjectives before any English noun without any theoretical limit, although there would be severe limitations on actual or desirable performance. For these and other reasons it would be impossible to list all the permissible sentences or to point to the longest sentence of any natural language. It has been these qualities among others about natural languages which have motivated grammarians to look for a finite system of rules which permit such variety and flexibility. This can only be done by developing a theory based on a speaker's competence rather than by examining any observable or collected body of speech performances.

The structural descriptions produced by the rules of the grammar attempt to explain what a speaker must know before he can interpret a sentence. A native speaker of English would, for example, be able to see two different meanings for a sentence like

(6) They are boring students.

[1] Noam Chomsky, *Aspects of the Theory of Syntax* (Cambridge, Mass.: The MIT Press, 1965), p. 8.

In order to see both meanings and to explain what they both are he must have the capacity for linking the word *boring* to *are* as shown in Figure 1 and to *students* as shown in Figure 2.[2] Our system of grammar must be built in such a way that it can explain such ambiguity by assigning two different structural descriptions for sentences like *They are boring students,* while it assigns only one to sentences that cannot be interpreted ambiguously.

FIGURE 1

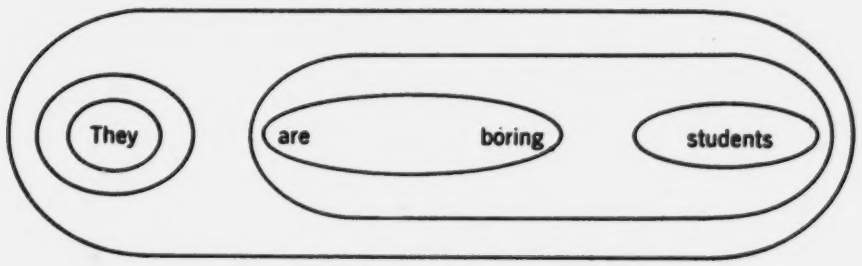
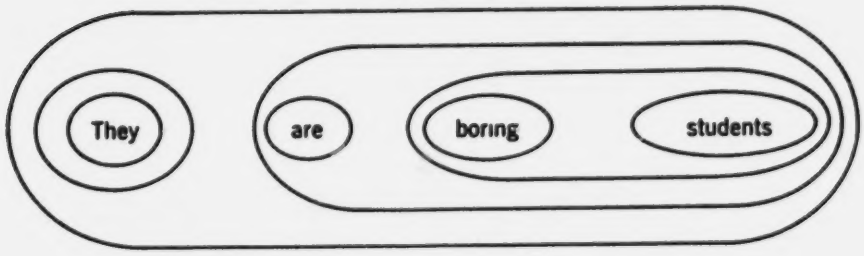


FIGURE 2



Before we can understand how a grammar which will assign structural descriptions to sentences of a language, or anything else we require of a grammar, can be built, some specific definitions would be helpful. If by a grammar we mean a system of rules which generates sentences, our system must be able to determine whether or not a given string of words is or is not a sentence of the language. In other words, a string is said to be grammatical or well formed if it can be described by the system of rules which forms our grammar and to be incorrect if the system of rules will not assign a structural description to it. This consideration is an effective way of building a check into a grammar. It also provides us with some useful analytical tools, since many of the finest insights of transformational theory have developed from considering why certain strings are not well formed. This can also be an important teaching tool, as seen in the discussion of sentences (1)–(5) above and in later examples discussed below.

[2] From *Biological Foundations of Language* by Eric H. Lenneberg. Copyright 1967 by John Wiley & Sons, Inc. Used by permission of the publisher.

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There are many appropriate and highly communicative utterances which will be called ungrammatical by the grammar, however, for the system describes rule-governed competence rather than actual or even desirable performance. Part of our teaching strategy should be to show that such utterances are communicative because they deviate from full grammaticality in an acceptable and regular way. We can also show that a complete grammatical system must account for the communicative role of various degrees of deviance from grammaticality. The poetry of e. e. cummings, and most poetry, provides many examples of this phenomenon. The poem "anyone lived in a pretty how town," for example, is understandable because we respond to the syntactic patterns employed as well as to the specific words employed in them. As I have already suggested, two of the objectives of teaching grammar may be to teach students the basic regularity of grammar and language and the most effective ways in which those regularities can be consciously violated for creative effect.

There can also be syntactically grammatical sentences which have no communicative value, such as Chomsky's *Colorless green ideas sleep furiously.* Because of conflicts in the semantic interpretations of these words used in this sequence, such sentences have no semantic (meaningful) communicative value. The same would be true of a string generated by the grammar which contained independent syllables not included in the particular language, such as *ksan* in English. These would also be syntactically grammatical but not meaningful phonologically. Still another possibility is the nonsense combination of possible sounds in an otherwise grammatical sentence, such as we find in Lewis Carroll's "Jabberwocky." The important point in all of these examples is that in terms of the theory of language the symbols and structures of the syntactic component of a grammar must be thought of as being without sound or sense until they are interpreted by the phonological and semantic components. If we are concerned with performance, however, we must assume that all three components function virtually simultaneously.

We shall expect a scientific grammar then to be able to distinguish between grammatical and ungrammatical sequences of the most obvious sort (and eventually to explain all kinds of deviations from full grammaticality). The syntax of the grammar should do so by rules which account for such things as the *division* of sentences into *constituents* (parts) like the circles used in Figures 1 and 2 above, the *identification* of these parts in terms of their *functional categories,* and the *arrangement* of words in the proper *order.* These rules will be explained in

more detail below, but in general they are instructions to rewrite or expand one symbol (which can stand for a word, a phrase, etc.) into a different but equivalent symbol or string of symbols. Their most basic function will be to divide something into parts in order to explain the underlying grammatical relations. Some of the rules will govern the structural or order change among or within parts and can thereby provide a clear description of the surface grammatical relations.

Other conditions placed on a scientific grammar are that it must contain methods of judging how well it is fulfilling its tasks, and that the theory of language of which it is a part must contain ways of judging between competing grammars. This last condition is particularly important in discussing generative grammars. Since they are trying to accomplish more than any grammatical theory has ever previously attempted, they seem much more complicated than earlier approaches. The transformational theory of language contains *simplicity* as one of its evaluative measures for grammars, but this notion of simplicity must not be interpreted as meaning that it is all right to be simple and wrong. Rather, it means we must choose the simplest of several grammars, each of which may adequately explain the same facts.

The theory and the methodology I have been discussing here are those of the transformational generative grammarian. I am convinced that the teaching of grammar must be done within the framework and principles of generative grammar because it offers teachers of English both the most adequate and the most pedagogically adaptable system of grammar. A detailed argument of adequacy is beyond the scope of this paper, and such an argument is easily available in the early work of the transformational theorists and in the works listed in the bibliography following this section. In the discussion below of a suggested program for the implementation of transformational grammar in the classroom, some attention will be paid to the inadequacies of previous grammatical systems, but the main focus of the argument will be on the strengths of transformational analysis to meet our objectives.

The choice of which grammar to teach is an important one, for the adequacy of the grammar as judged by linguistic criteria may not be the same as its adequacy on pedagogic grounds. Insofar as we are trying to be honest with our students, we should be candid about both the strengths and weaknesses of whatever system of analysis we eventually decide on. Similarly, the rapidly changing nature of transformational theory itself may make many of its specific claims either questionable or at best oversimplified by the time they are taught in the classroom. Neither problem needs to be incapacitating, however, for the

insights to be gained by the application of a system of analysis like that of transformational grammar into the nature of language will continue to be interesting and important to our students even if better or more refined systems of analysis are later developed. For the present those who disagree with the transformationalists' attempt to formulate a grammar of English as a rule-based system for assigning structural descriptions to sentences will be justified in their exclusion of it from the curriculum. Similarly, those who argue that such criteria as "teachability," "familiarity," or "simplicity" should be our criteria for choosing a pedagogically appropriate grammar stand on somewhat firm ground at the present, since there is little question that most English teachers are unfamiliar with transformational theory, that many who have tried to study it have found it complicated, and that, for these and other reasons, it is not presently very teachable.

Such arguments are becoming increasingly shaky, however, for more and more linguists and English teachers seem to be accepting the essential notions of transformational theory, more and more school texts are being based upon it, and more and more introductory materials for teachers are beginning to appear. The most helpful of the last is Owen Thomas' *Transformational Grammar and the Teacher of English*,[3] to which this article is greatly indebted. This and other works invaluable to anyone who wants to learn more about the theory are listed in the bibliography which follows this section.

As English teachers we cannot wait for a "perfect" grammar to be developed or insist that the unstable or unfamiliar nature of a new theory means that the old one is as good as ever. But with a transformationally based grammar we can teach our students to control and understand their language and thus improve their ability to perceive grammaticality, ambiguity, synonymity, and other relations between sentences. Our own knowledge of the theory will help us to understand our students' strengths so we can correct their weaknesses. Although their competence as speaker-hearers has been acquired through little or no deliberate instruction, transformational theory can provide us with insights into that competence which will help us lead them to improved spoken performance and strengthen their control of written language skills which must be acquired through deliberate instruction.

WHEN? FOR WHOM?

Before we can ask what we should teach, we must first consider the related questions of whom we are teaching and when we consider such

[3] New York: Holt, Rinehart and Winston, Inc., 1965.

teaching appropriate. An approach to grammar which involved the abstract analysis of language much before the seventh grade might be self-defeating. The elementary program should be consistent with and preparatory for such an approach in the secondary school but need not include it. Such exercises as examining the constituent structure of sentences and their interrelations can be handled in the elementary program in an informal and nonrigorous manner through the teaching of basic reading and writing skills. If every elementary teacher knows some linguistics, then the insights of the transformational grammarian could be naturally and informally integrated into language arts instruction. Just as spoken competence must precede discussions of the spoken language and its nature, so we should try to develop basic skills with the written language through methods which are as devoid of abstractions as possible.

Without an extensive discussion it would be impossible to justify any particular starting point for the abstract and formal analysis of language, but that is essentially beside the point here. Some of the curriculum study centers, particularly the Oregon Center, do begin their grammar programs with transformational analysis in the seventh grade, but good arguments could probably be made for either an earlier or a later start. The only point to be stressed is that such study should occur formally at some point in the curriculum and that the insights of the linguists should pervade all teaching of language skills and concepts.

One question which remains, and for which I have no ready answer, is the efficacy of the transformational approach for those variously called slow learners, noncollege-bound, terminal students, and so on. Most students who can readily handle the abstractions of such subjects as mathematics should have little or no difficulty mastering the basic concepts of transformational analysis, and many of them should rapidly become proficient at it if properly taught. The slower sudents present us with a double problem, for not only are they the students who have the most difficulty with abstractions of any kind, but they are also the ones whose remedial needs in language skills are the greatest. The kind of program suggested in the next section will be much more difficult to teach to slow students and would probably require considerable adaptation, but it or something like it must be developed for all of our students unless we are prepared to abandon either them or our goals.

A properly developed language program based on the idea that even the slowest student has mastered an internal grammar which enables

him to function as a speaker of English (or at least his dialect) is our best hope for getting him interested enough in language to want to know more about it. If he can be motivated to explore his own competence, he should be able to recognize the gap between what he "knows" and what he uses. This would be only a first step, but one that shows far more promise than most of our current practices. This would be particularly true if, as is often the case, he has internalized the grammar of a dialect which sounds substantially different from the standard American English he will need to function effectively in a middle-class dominated society. Even a dialect which sounds very different may be fundamentally similar to the prestige dialect. For example, the pig Latin version of English sounds different enough to be unintelligible to someone who doesn't know that its syntax, semantics, and even basic phonology are identical to English and that what makes it sound so different is a very minor rule. Using such examples to explore the grammatical variations between dialects may promote sufficient interest in language to motivate improvement in performance.

Particularly important for such students, even those categorized as reluctant or as disadvantaged, is the development of a more positive concept of the self. Students with marked academic aptitude find their self-concepts constantly being praised and rewarded by the schools, but most of the rest see little in the school program that they find particularly relevant to their lives or the real world they live in. Since language is a universal trait of normal humans, it may prove to be a key factor in building a more positive self-concept which will in turn be a bridge to the rest of the school experience. The analogy between visual and linguistic perception may prove to be a powerful technique in developing student interest in language and in showing them the psychological reality of the perceptual process involved in understanding sentences.

TEACHING TRANSFORMATIONAL GRAMMAR

One of the principal advantages of transformational grammar in the teaching process lies in its rich possibilities for student involvement in solving genuine linguistic problems. Heretofore our approach has been largely dominated by rote learning and a drill methodology in which students could only get involved if they were willing to question what was presented to them in the traditional school handbooks. This was true because most teachers had little real linguistic training or understanding. Even the introduction of the structural

linguists' frame substitutions and sentence pattern drills, which were better understood by teachers, have proved to be only a little more valuable for students to learn because, ironically, they left more aspects of language unexplained than the traditional formulations had.

Although the structuralists rightly decried the unsystematic nature of traditional grammar with its semantic definitions, prescriptive rules, and neglect of the spoken language, their own theory was too rigidly limited. They were led to a method of linguistic investigation which was almost totally devoted to discussing the observable structure of sentences, because they felt this was the only legitimate data available to them. Yet, as the best of the traditional grammarians had always known, many vital ideas about language must be discovered from evidence which is not present in the observable or surface structure of the sentence.

A corollary to this concern with surface structure was the structuralists' belief that a relatively small number of significant generalizations could be made about language, since the only data which could be used was a collected or potentially collectable body of utterances. Most structuralists rejected any kind of reliance on linguistic intuitions or "hunches." They did not try to explain language in terms of a rule-governed system conceived as a model which can explain how speakers are able to produce and understand sentences they have never previously heard. While these restrictions on their theory are overstated and were often not fully followed in practice by the finest of the structural linguists, they are generally accurate. Precisely the opposite point of view on these issues has been adopted by Noam Chomsky and his colleagues. They have attempted to find as many significant generalizations about language as they can, relying on their intuitions as native speakers as a guide to looking for such generalizations. From them they hoped to build a formal system of rules which will be able to mechanically generate any sentence in the language. To do this, transformational theory has returned to many of the insights and the universal concerns of the earlier traditional grammarians, and Chomsky has repeatedly pointed out the similarity between the goals of the two approaches.

Deep and Surface Structure

The most important ideas for students to understand at the outset of their study of grammar are the concepts of *deep* and *surface structure* and their interrelationship. These are the fundamental aspects of transformational theory and can and should be taught to all students, although probably not at the same time or in the same way for each of

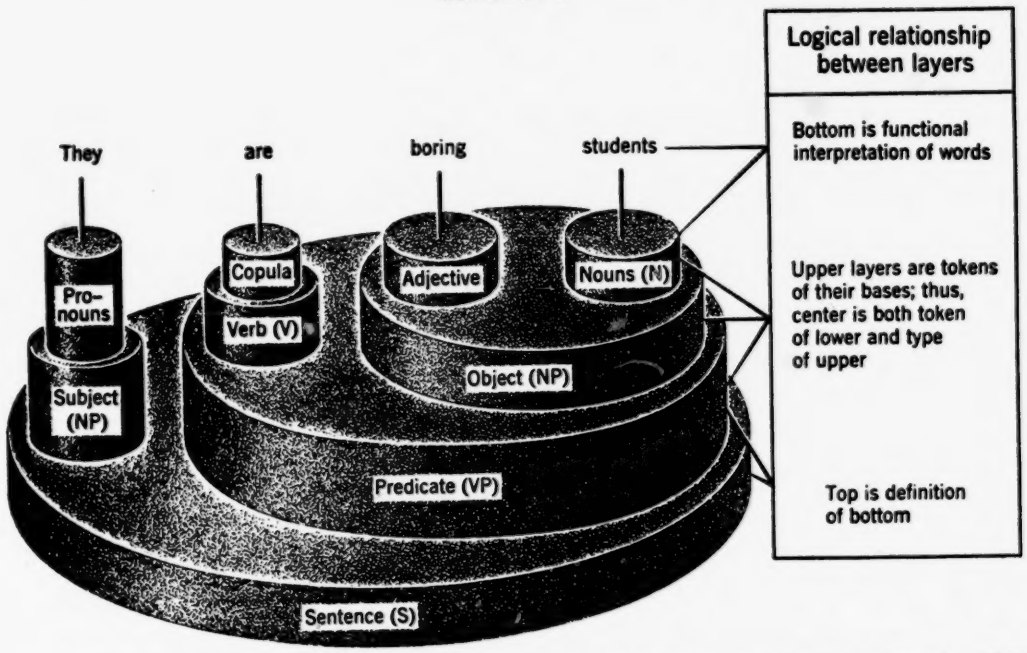
them. These are also the things which the students already "know" about their language, and the techniques presented here can help to prove to them that they do "know" it and build their confidence that they can know it better. Once a student has mastered these ideas and their applications to English, he will be able to use them as tools in working with practical aspects of language use. He will also, depending on his interest, be able to use the structure they reveal in language to deepen and broaden his understanding of the nature of language.

Perhaps the easiest and most revealing way of demonstrating the differences between deep and surface structures would be to consider structurally ambiguous sentences like the following, which have been frequently used as examples by Chomsky and others in the transformational literature.

(6) They are boring students.
(7) Flying planes can be dangerous.
(8) the shooting of the hunters

In sentences and phrases like these we must look for an underlying structure or structures which can explain how and why we understand these sentences in more than one way. One way of showing how different deep structures govern each interpretation would be to label the circles of Figure 1 above, or to illustrate them in a diagram of cylinders as in Figure 3 below. This is one way of illustrating the grammatical princi-

FIGURE 3[4]



[4] From *Biological Foundations of Language* by Eric H. Lenneberg. Copyright 1967 by John Wiley & Sons, Inc. Used by permission of the publisher.

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ples which govern one interpretation of the sentence. These grammatical relations are determined in deep rather than in surface structure, for the other interpretation of sentence (6) would demand a different set of relations with an active verb *are boring* rather than the linking one shown in Figure 3 and a single word object *students* as well as a change of referent for the subject pronoun *they*.

In presenting these ideas to students two different but related methods should be employed. The first, hinted at above, involves having the student work toward solutions of genuine linguistic problems so that he discovers for himself the relevance of such problems and concepts as those involved in deep structure. I have used the word *genuine* deliberately, since at least some of the problems which even beginning students can attempt can be those which have no clear or universally accepted solution. One can legitimately question the value of an "inductive" approach which does little more than deceive students by making them think they are working on significant problems which are actually only drill. For example, it would be easy to claim that having students examine the function of words in surface structure in order to assign them to syntactic categories is a genuinely inductive approach. If done in a way that results in arriving at predetermined answers, however, it is both disingenuous and eventually self-defeating to claim that this is a "discovery" method of teaching.

Drill is important, of course, and it is perfectly acceptable if it is honestly presented as such. The second methodology I will advocate—presenting the students with a workable grammar of English based on transformational syntax and having them mechanically generate sentences—will involve a considerable amount of drill and practice. It is essential, however, for both of these methods to be included in the teaching of transformational grammar, because the first alone will be likely to leave the impression that we don't know anything about language and the second alone might imply that we know more than we do.

Phrase Markers

One of the important concerns of the transformationalists has been the examination of the relationships between sentences. This has provided them with many significant clues to the relations between deep and surface structure and information about constituents of sentences at all levels of structure. Such a practice, as well as the development of ways of illustrating and describing the grammatical relations which are discovered, will obviously be of considerable value to students as well. Teaching these ideas might begin with the structural methodology of

examining the surface structure of sentences to determine what similar patterns can be deduced from them. Such a process is adequate as far as it goes, and the students can thus be rapidly led to the comparison of sentences and considerations of deep structure and transformations.

For example, a student presented with the following sentences, first used by Chomsky and later by many others, should be able to see that they are related. By beginning to think about and discuss their relationship, he should begin to come to some interesting insights about the structure of English.

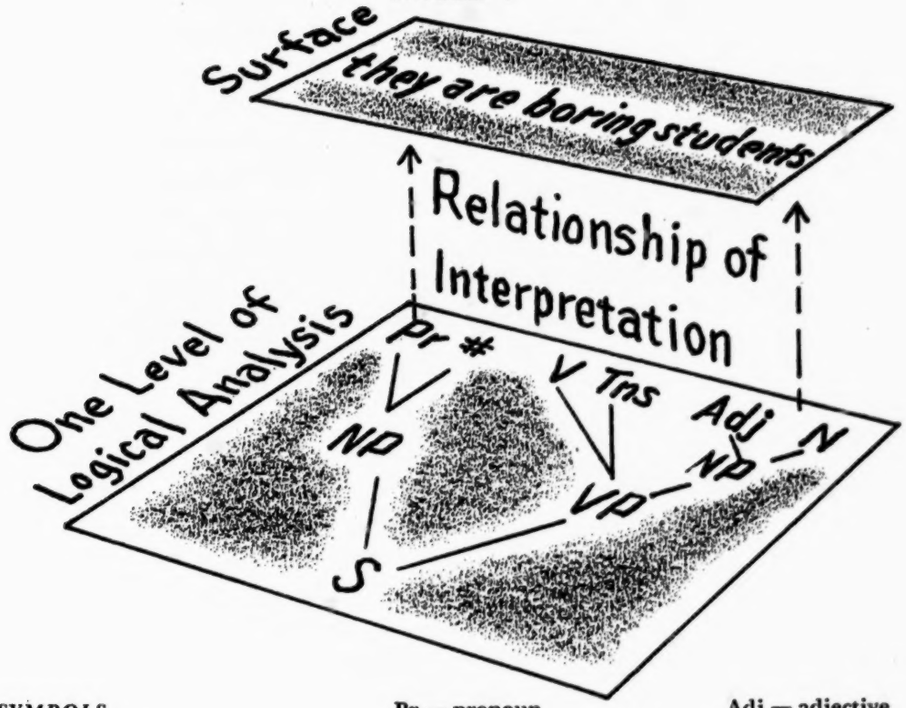
(9) John is easy to please.
(10) John is eager to please.
(9a) It was easy for us to please John.
(10a) *It was eager for us to please John.
(9b) *He was easy to please us.
(10b) He was eager to please us.

Even the most untrained native speaker of English should be able to see that there is something wrong with the sentences preceded by an asterisk (used here and later to designate an ungrammatical sequence or string), and from this conclude that there is a greater difference between sentences (9) and (10) than is apparent from their observable structure. If he had learned to divide sentences into their related parts (constituents) he could say that *John* seems to be the subject of both sentences and that the predicates only differ in terms of the semantic (meaning) difference between *easy* and *eager* (as well, of course, as the sound or phonological difference). He might suspect that there are even more differences, and from the evidence of the "a" and "b" sentences he should realize that in some way in (9) *John* is the object of *please* while in (10) *John* is the subject of *please*.

It is from insights such as these that the transformational grammarian has been led to try to formulate precisely the nature of a deep or base structure which underlies the surface or observable structure. It is within this deep or base structure that such notions as "subject" and "object" must be found, for the apparent relations deduced only from surface structure are often misleading or uninformative as to what is actually happening in the sentence.

In order to discuss and formalize these structures of language, transformational theory has developed the process of illustrating them by means of *branching tree diagrams* usually called *phrase markers.* They are a way of making the information contained in Figure 3 more readily accessible. The diagrams below illustrate the *underlying phrase markers*

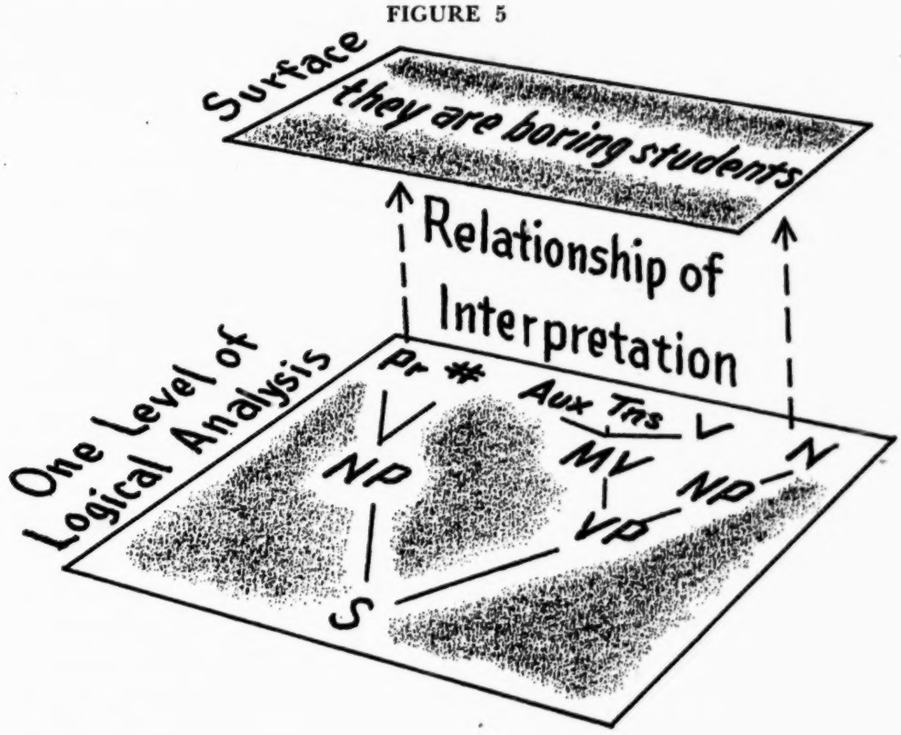
FIGURE 4



SYMBOLS

S = sentence
NP = noun · phrase
VP = verb phrase
Pr = pronoun
# = number
V = verb
Tns = tense
Adj = adjective
N = noun
Aux = auxiliary
MV = main verb

FIGURE 5



which determine each of the readings of sentence (6) and correspond to the circles used to separate the constituents in Figures 1 and 2.

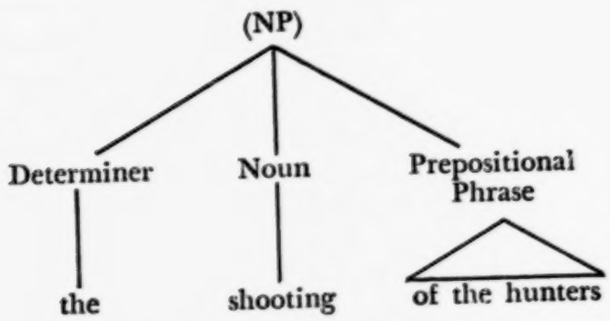
Such phrase markers as those in Figures 4 and 5[5] (p. 139) must specify four things about a sentence: first, the set of words (or minimally functioning syntactic elements such as markers for tense, number, etc.) of which it is composed; second, the order of those elements (sometimes called *formatives*); third, the groups of formatives that form the constituents (parts) of the sentence (it is the different constituent structure illustrated in Figures 4 and 5 which governs the ambiguous readings of (6)); and, finally, it must specify the syntactic categories to which each of the constituents belongs.[6] Only one underlying phrase marker can be generated for an unambiguous sentence, while two or more will be needed to characterize the underlying structure of ambiguous ones. It is evident that the words themselves can give us no direct clues to their syntactic functions since most words that carry information can be used in several categories. Nor is categorical information sufficient to determine meaning, as can be seen in the phrase:

(8) the shooting of the hunters.

The immediately underlying phrase marker of such a phrase would have to have a structure something like this:

FIGURE 6

Noun Phrase



But even this would not be sufficient to show that its meaning can be interpreted in relation to some further underlying elements which can mean either *Hunters shoot* or *Hunters are shot.* Each of these would have a distinct underlying phrase marker, and each of these phrase

[5] Adapted by permission from *Biological Foundations of Language* by Eric H. Lenneberg. Copyright 1967 by John Wiley & Sons, Inc.

[6] Jerrold J. Katz, *The Philosophy of Language* (New York: Harper & Row, 1966), pp. 124–125.

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markers could be changed to the one which underlies (8). From examples like this one we see that we must sometimes impute abstract underlying structures to sentences on the basis of insights which are anything but obvious from the surface structure in order to characterize the grammatical relations which are actually controlling the interpretation of the sentence. Such discoveries also lead us to examine the rules which generate base structures and which govern the changes from the underlying structure to the observable sentence.

Base and Transformational Components

Through the devices of examining related sentences and ambiguous elements and considering the possibility of underlying structures with significantly different features than those that appear on the surface, teachers should be able to motivate their students to examine the nature of language and of their own competence as native speakers in an exciting and meaningful way. If such motivation can be developed, then they can begin to deal with the more formal aspects of characterizing the deep structure specified by the grammar, for up to this point no attempt should have been made to give any systematic formulation of how such a structure is arrived at.

As the theory is presently formulated, the syntactic part of the grammar contains two basic subparts called the *base component* and the *transformational component.* The base component contains a series of *phrase structure rules* (probably a very limited number) which allow us to construct *underlying phrase markers for sentences.* It also contains a *lexicon* which contains the words of the language as well as information about their syntactic properties which restrict their insertability in the branching trees constructed by the phrase structure rules. (An example of the latter idea can be seen in the fact that sentence (3), "Watermelons love to eat George," is ungrammatical because the verb *eat* cannot be used with an inanimate subject. Such restrictions would have to be built into a complete grammar of English, but there is some debate among the theorists as to whether this should be formulated as a syntactic or a semantic property.)

Presentation of the material involved in learning how the base component works would be most efficiently done directly rather than through a continual posing of problems, but constant questioning of the material presented should be carried on concurrently. The last is important because the phrase structure rules presented in available school texts and in most of the professional literature are at best misleading and often erroneous.

The second part of the syntax, the transformational component, contains *transformational rules* which govern the changes from deep or base structure to surface or observable structure. These rules manipulate, substitute, and delete elements of the base phrase marker to produce eventually from it the phrase marker which illustrates the sentence's surface structure. The discovery and formulation of these rules is the most powerful aspect of this approach to grammar, so much so that it is the source of its name. What transformation rules accomplish, in essence, is the explanation of how deep and surface structures are related. While it is obvious enough that sentences have surface structures, and obvious to anyone who has examined any sequences of sentences like those presented here that there is a deeper structure, until transformation rules were formulated, there was no way to precisely explain the relations between them. Formidable problems remain in formulating such rules, however, and while it is relatively easy to show what a transformation is and how it operates, the development of a complete transformational repertoire for any particular natural language is an extremely difficult and still largely unfinished task.

The base component's phrase structure rules could be introduced very early in the program. As they are presently formulated, all of them cannot be introduced in one year, particularly if we begin the process in the seventh grade as suggested here. It would probably be a good idea to introduce enough of them each year so that each grade level could have a complete enough set to be able to work with to generate interesting sentences. The method suggested here is in some ways similar to the way Thomas uses "Model Grammars" and to some of the proposals of the Oregon Curriculum Center.

Such a model grammar approach is not to be understood as the same kind of repetition which has been the bane of grammar study in the past. For example, this approach could consider in one year primarily the phrase structure properties of nouns, noun phrases, and so on with little or no attention to the complexities of verbs. Similarly, only some transformations could be introduced in each year. The earliest perhaps should be those which govern such things as number agreement and tense formation which are needed in every sentence. These could then be followed with those which provide increasing depth of understanding about the particular constituents chosen for examination in that year. Such an approach would enable students to proceed to an increasingly deeper analysis which would be primarily concerned with really different material at each level, and yet it would include enough repetition to ensure adequate review.

Phrase Structure Rules

Phrase structure rules are rules of the form:

PS–1 $S \longrightarrow NP + VP$

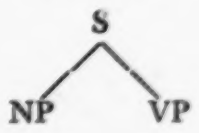
The above rule can be interpreted to mean: "a sentence can be rewritten as a noun phrase followed by a verb phrase."

SYMBOLS:

S = sentence
NP = noun phrase
VP = verb phrase
$\longrightarrow$ = "can be rewritten as"
$+$ = linking or *concatenation*

A series of such rules can generate a branching tree diagram or phrase marker, because they follow the convention that each rule can rewrite only one categorical element or symbol at a time. The rewriting process is illustrated by drawing lines from the point (or *node*) representing the original symbol to the symbols which it is rewritten or expanded as. Therefore PS–1 above would create the following tree:

FIGURE 7



A series of these rules can then be written which will deal with finer discriminations and, in theory, permit us to generate an underlying phrase marker for any sentence in the language.

Using rules of this pattern students can be taught the basic mechanisms of tree generation, the qualities of the labeled constituents, and their functional interrelations. For example, using PS–1 we could define the notion "subject of a sentence" as an "NP directly dominated by the S." (One node is said to *directly dominate* another if they are connected by a straight line with no intervening nodes.) It must be remembered, however, that such a definition refers only to the base or underlying structure relationships of a sentence, which may or may not be the same as the apparent relationship derived only from a consideration of the surface structure. Therefore, when the transformationalists talk about such relationships as subject-predicate, verb-object and so on, they are usually talking about deep structure. There are times, of course, when surface structure relations must be considered, but the important generalizations and the grammatical relations which have most to do with determining the semantic interpretations of sentences must be discovered at deep rather than at surface structure.

It would be nonsense, for example, to talk about the fact that all sentences have subjects that are "an NP directly dominated by S" for an imperative sentence like (11) if all we have to go on is the surface structure:

(11) Help the boy.

Similarly, in order to explain all of the grammatical relations which obtain in sentences (12) and (13a–13b) we must depend primarily on explanations gained from considerations of deep structure. (These sentences have also been frequently used by Chomsky as examples.)

(12) The ball was hit by John.
(13a) John persuaded the doctor to examine Bill.
(13b) John expected the doctor to examine Bill.

In sentence (12) the subject-verb relationship is most probably (in deep structure) that of *John-hit,* and this is a very important factor in the way we interpret such a sentence. Similarly, the differences between the (13a–13b) sentences only become apparent when we examine the related sentences (13c–13f). Once we recognize what the differences are, we realize that they cannot be accounted for by the minor surface structure dissimilarities.

(13c) John persuaded the doctor that he should examine Bill.
(13d) John persuaded Bill that he should be examined by the doctor.
(13e) *John expected the doctor that he should examine Bill.
(13f) *John expected Bill that he should be examined by the doctor.

It seems clear from examining these sentences (13c–13f) that at some level of underlying structure *persuade* must occur in a pattern: *NP–VP–NP–Clause,* and *expect* must have the pattern: *NP–VP–Clause.* Such a pattern for *persuade* is not at all evident in the surface structure of (13a), and yet with the insight derived from the related sentences we can see that the structure must be operative there as well.

It is important to realize that *all* sentences have an underlying structure which differs from their surface structure. Precise characterization of this deep structure is currently a matter of considerable dispute among transformational theorists, but the basic need for such a structure is clear to all. One of the problems which has not been solved includes the precise border between the syntactic and semantic parts of a complete grammar. Others have to do with how much abstract underlying structure to impute to sentences whose surface structures are apparently simple and straightforward. One of the reasons for this last dispute is that at this stage of the development of transformational theory linguists are not particularly concerned with generating a structural description

for particular sentences but rather with discovering the rules which generate descriptions for whole classes of sentences which have similar properties. Therefore, it sometimes seems more plausible to describe even the simplest sentences as having a complex abstract underlying structure, if to do so will permit the rules of the grammar to explain how additional clauses and other elements are added. It should probably be pointed out here once again, however, that describing sentences in such a way may only prove to be a property of the abstract system of description called a grammar and is in no sense to be construed as a model of how speakers actually function in the production and understanding of sentences.

Transformations

The introduction of transformations should not be too difficult for students if all the complications of the system are not presented at once. Students who understand the basic principles of phrase structure can easily be shown that *transformations operate on phrase markers,* rather than on single symbols, and that they can change or distort them by rearrangement, substitution, deletion, and so on. The result of each transformation is another phrase marker. When all the transformations have been applied, the result is that the *final derived phrase marker* will be that of the surface structure. This generalized applicability to structures which fulfill certain specified conditions gives transformations their power. They are able to change a general class of structures, and the grammar is not required to have separate rules for each sentence changed. For example, we can write a rule which will delete the subjects of all imperative sentences and then we don't need individual rules for each such sentence.

Since all seventh grade students have, of course, been using transformations for years, illustrating them will be easy, and the process can have begun in an informal way in the elementary school. A more difficult problem is the precise formulation of the rules, their procedures, and the conditions under which they operate. How detailed one should be in teaching these rules, procedures, and operations depends on the specific objectives one has in mind. Most of the required sequence in grammar suggested here can probably be taught by means of relatively informal statements of transformational rules. The basic ideas of what transformations do are important and easy to learn. So are some of the most important transformations operative in English. But the precise, formal details of how they accomplish what they do are probably too complicated for introductory purposes.

It could easily be shown to students, for example, that sentences like (14), traditionally called complex sentences with relative clauses, are formed by a process of embedding a distorted form of one sentence into another:

(14) Boys who live in cities love girls.

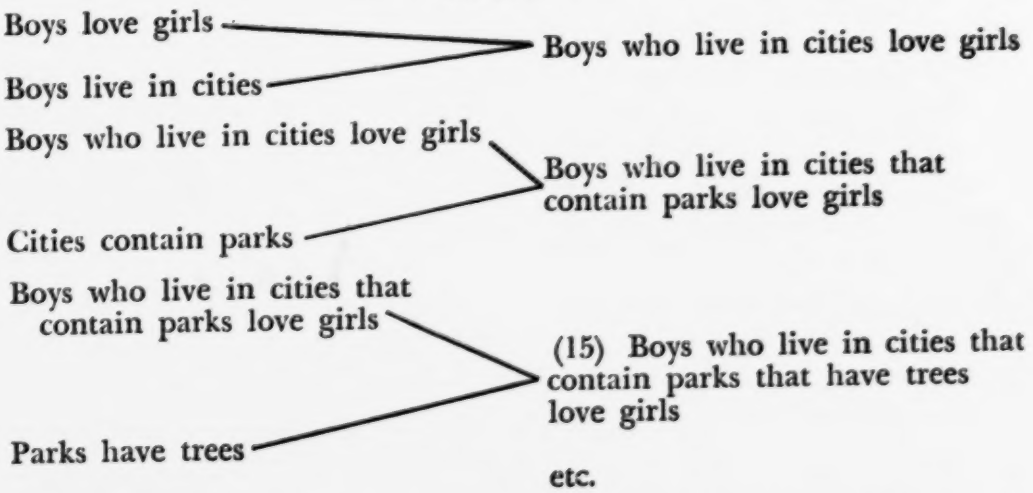
In this sentence it is clear that the clause *"who live in cities"* is formed from a sentence *"boys live in cities"* which underlies (14). An adequate transformational component must be able to account for the transformation which produces this type of sentence.

It should also be clear that the rule which embeds one sentence into another in this way is *recursive* in the sense that it can be repeated without any theoretical limits to form sentences such as (15) or even longer ones.

(15) Boys who live in cities that contain parks that have trees love girls.

(Obviously there would be practical constraints on how long such a sentence could or should be in an actual speech or listening situation, but the competence of a native speaker to keep adding relative clauses in this fashion, particularly if aided by pencil and paper, seems clear.) A rule which enables us to understand such an infinite set of sentences is called a *recursive rule*, and this property of transformations which embed sentences also guarantees that there can be no "longest sentence" in a natural language, since all natural languages have recursive rules. This process is illustrated informally below.[7]

FIGURE 8


Boys love girls
Boys live in cities
Boys who live in cities love girls
Boys who live in cities love girls
Boys who live in cities that contain parks love girls
Cities contain parks
Boys who live in cities that contain parks love girls
(15) Boys who live in cities that contain parks that have trees love girls
Parks have trees
etc.

[7] Diagrams from pp. 145–147 in THE PHILOSOPHY OF LANGUAGE by Jerrold J. Katz. Copyright © 1966 by Jerrold J. Katz. Reprinted by permission of Harper & Row, Publishers.

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If we decide to formalize and make more explicit the process by which such embedding can take place, we must first give our students a more complete set of phrase structure rules and then provide transformational rules. Two additional phrase structure rules needed here might be the following:

PS–2 $VP \longrightarrow V + (NP)$

PS–3 $NP \longrightarrow \begin{cases} (Det) + N + S \\ NP + (S) \end{cases}$

NEW SYMBOLS:

V = verb
Det = determiner
N = noun
( ) = an optional element
{ } = mutually exclusive options

By so adding to the phrase structure we would permit the optional possibility of an embedded sentence in every noun phrase. If we then permit our phrase structure rules to operate in a cycle, then every time an optional sentence was chosen we could return to our first rule ($S \longrightarrow NP + VP$) and provide a derivation for the embedded sentence in the same way one was provided for the original sentence. This would then permit us to construct a simplified underlying phrase marker for (15) which would look something like Figure 9 (p. 147).

In order to convert such an underlying phrase marker into the final derived phrase marker of (15), one of the transformations that has to be applied is the relative clause transformation. One important convention which we should note here is that transformation rules operate first on the most deeply embedded structure dominated by S (*parks have trees* in Figure 9, p. 147) with reapplications of the same transformations applying next to the second most deeply embedded sentence and so on. A graphic way of seeing this might be to understand that, in converting the underlying phrase marker Figure 9 to the final derived phrase marker in Figure 10, the transformations apply first to the sentence node at the bottom of the marker and move up to the topmost occurrence of "sentence."

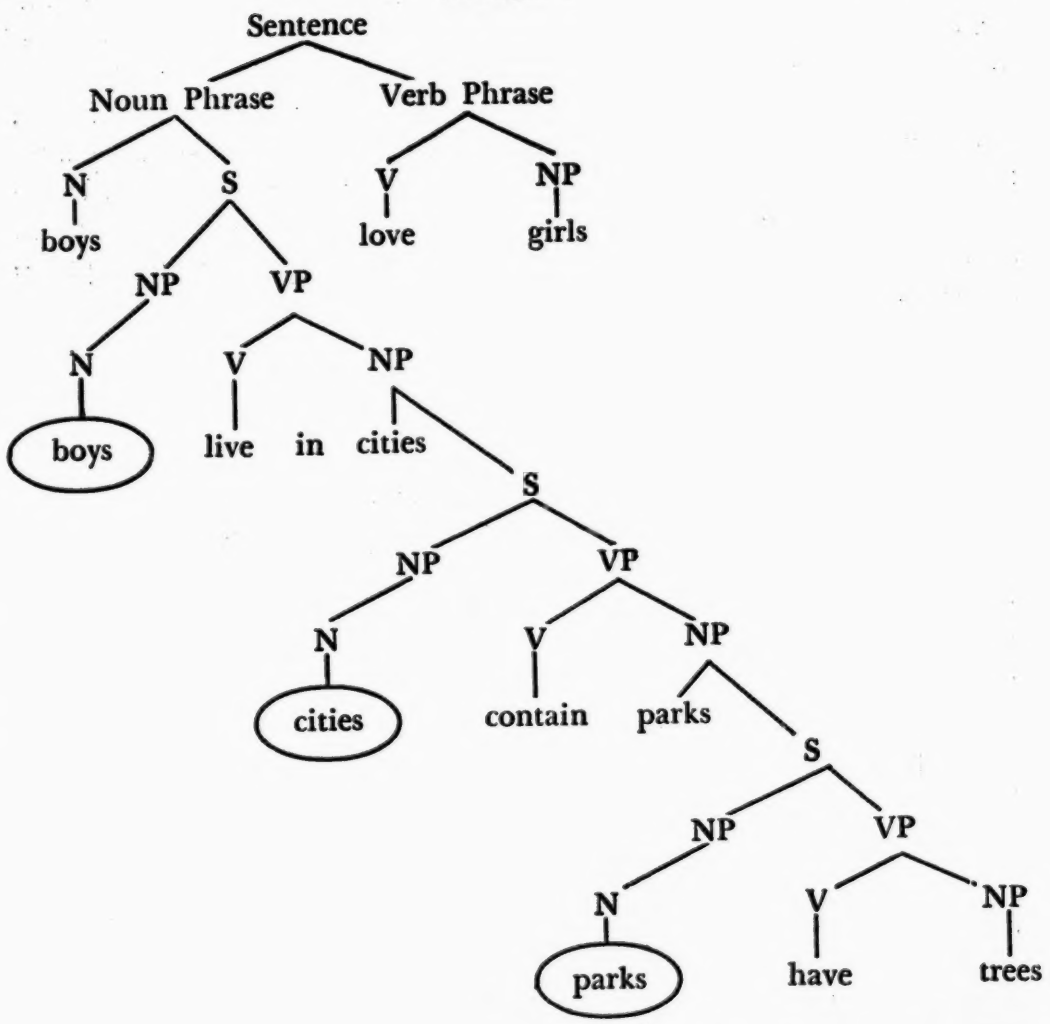
The need for transformations of this sort springs from the fact that in English we cannot have a sentence of the form

(16) *boys (boys) live in cities love girls

but that such a string would be transformed to the sentence

(14) Boys who live in cities love girls.

FIGURE 9

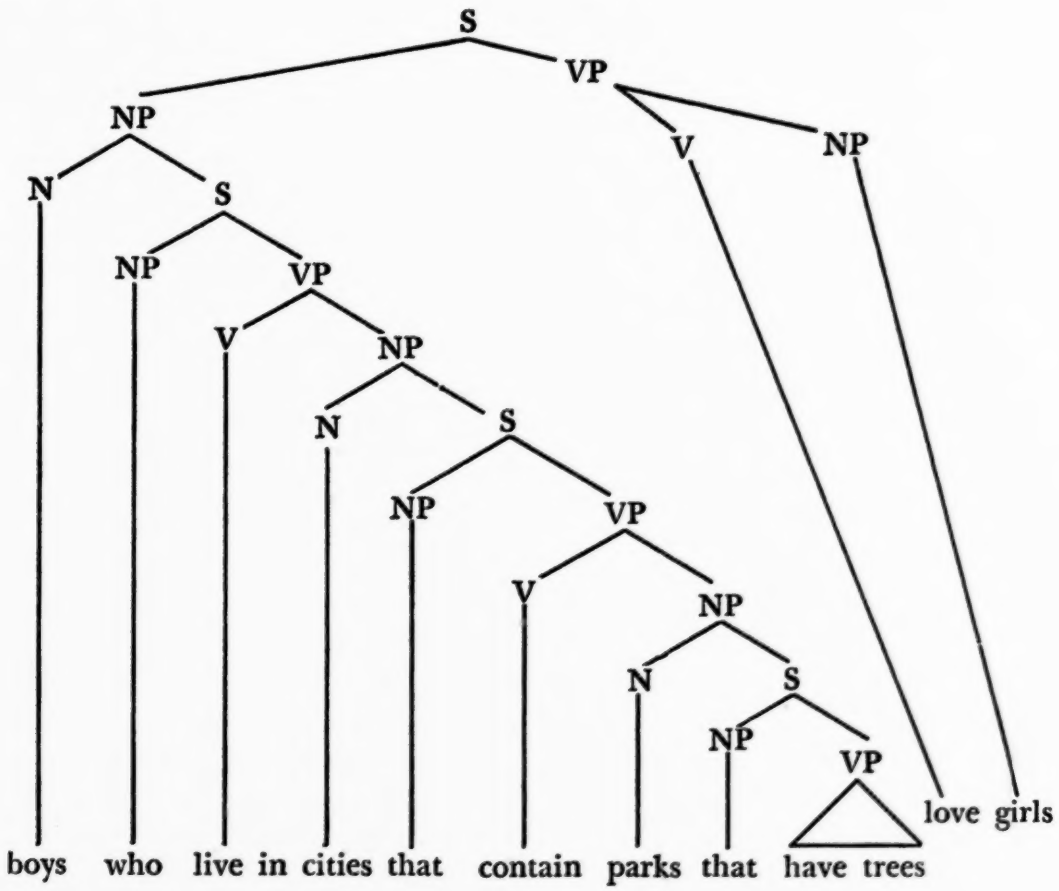


We could express such a transformation informally for any individual case such as the one above, but, in order to express the significant linguistic generalization concerning relative clause formation, we will need a more general and therefore more abstract representation. The relative clause transformation rule must be expressed in such a way that, whenever a phrase marker appears with the appropriate elements, it can apply.

The necessary structure (or phrase marker) in English seems to be one in which there are two identical NP's next to each other as in sentences like (16) and the phrase marker shown in Figure 9. When this occurs the relative clause transformation deletes the second NP and substitutes for it the appropriate relative pronoun. In Figure 9, for example, the circled nouns would be relativized by repeated applications of

such a transformation. (The underlying phrase marker, Figure 9, and the above rule have been deliberately simplified so that the problems of movement of elements—i.e., how the NP's get next to one another—and the other transformations which would be needed to generate such a sentence can be ignored for illustrative purposes.) Then, with the addition of rules or restrictions which would guarantee the selection of the correct form of the relative, a successive application of such a relativization rule to Figure 9 would give us something like the derived phrase marker below:

FIGURE 10



Students can be shown that transformations add great flexibility to a grammar by their generalized power of application and the recursive properties they introduce. Transformations also provide a certain amount of control over the relations between deep and surface structure. The requirement that identity between the two NP's must exist before relativization can occur prevents us from getting a great many ungram-

matical sentences. Similar restrictions on other transformations help to show that there are not an infinite number of phrase markers underlying any particular sentence.

High school students who have been provided with these and other tools of transformational analysis of syntax will understand the nature of their language better than has ever been possible before. Whether this will be translatable into direct, concrete improvement in performance is still a very open question. The answer will probably depend on how well their English teachers know and understand transformational theory and on how well and how fully it pervades their teaching. I suspect that some students who have received the kind of basic grammatical training suggested here may want to go further in their training in the study of language. For those students the possibility of an elective course for perhaps a semester of the senior year in advanced transformational analysis might be a very fruitful addition to a school program.

How much value the tentative suggestions proposed here might have for any particular language program is hard to predict, but I am sure that English teachers will have to learn more about transformational theory than could be presented here. The control and freedom of choice which can result from really understanding the nature and structure of language should not be denied to any of our students. Whether or not we teach them transformational grammar directly, the insights it can provide us about language should pervade all of our teaching and thereby provide our students with more of the skills and concepts they will need to function as free and responsible human beings.

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